THE JOURNAL OF PHYSIOLOGY

EDITED FOR

THE PHYSIOLOGICAL SOCIETY

BY

P. F. BAKER J. A. V. BATES G. W. BISSET
H. BLASCHKO K. E. COOPER J. DIAMOND
P. FATT B. L. GINSBORG A. A. HARPER
D. K. HILL N. JOELS M. G. M. JUKES
J. F. LAMB J. N. MILLS D. S. PARSONS
C. RASHBASS E. G. WALSH J. G. WIDDICOMBE
R. H. ADRIAN (*Secretary*) W. F. WIDDAS (*Chairman*)

Volume 211

1970

CAMBRIDGE UNIVERSITY PRESS

PUBLISHED BY
THE SYNDICS OF THE CAMBRIDGE UNIVERSITY PRESS
Bentley House, 200 Euston Road, London, N.W.1
American Branch: 32 East 57th Street, New York, N.Y. 10022

Printed in Great Britain at the University Printing House, Cambridge

CONTENTS OF VOLUME 211

No. 1. *November*, 1970

PAGE

Response characteristics of muscle afferents in the domestic duck. By PATRICIA K. DORWARD 1

The relation between calcium and contraction kinetics in skinned muscle fibres. By R. J. PODOLSKY and L. E. TEICHHOLZ . . 19

Selective hypersensitivity to bradykinin in salivary glands with ligated ducts. By S. M. HILTON and SONIA H. TORRES . . . 37

Consumption of kininogen in the submandibular salivary gland when activated by chorda stimulation. By K. M. GAUTVIK, S. M. HILTON and SONIA H. TORRES 49

Afferent vagal fibres with an expiratory discharge in the rabbit. By J. C. LUCK 63

Permeation and distribution of deuterated and triated water in smooth and striated muscle. By B. C. ELFORD 73

Effect of environmental temperature on the turnover of 5-hydroxytryptamine in various areas of rat brain. By M. A. SIMMONDS 93

The glycogenolytic response to stimulation of the splanchnic nerves in adrenalectomized calves. By A. V. EDWARDS and MARIAN SILVER 109

Cat colour vision: evidence for more than one cone process. By N. W. DAW and A. L. PEARLMAN 125

Stimulus–response curves for the pulmonary vascular bed to hypoxia and hypercapnia. By GWENDA R. BARER, P. HOWARD and J. W. SHAW 139

Thyroxine utilization in the new-born lamb. By P. W. NATHANIELSZ 157

Temperature dependence of non-electrolyte and sodium permeability in giant axon of squid. By CECILIA HIDALGO and RAMÓN LATORRE 173

Effect of stimulation and hyperpolarization on non-electrolyte and sodium permeability in perfused axons of squid. By CECILIA HIDALGO and RAMÓN LATORRE 193

PAGE

Selective reinnervation of two cell populations in the adult pigeon ciliary ganglion. By LYNN LANDMESSER and G. PILAR . 203

Voltage clamp of the *Aplysia* giant neurone: early sodium and calcium currents. By D. GEDULDIG and R. GRUENER . . . 217

Mechanism of action of pyrogen. By W. FELDBERG and P. N. SAXENA 245

No. 2. *December*, 1970

Persistence of the cardio-inhibitory response to brain stem ischaemia after destruction of the area postrema and the dorsal vagal nuclei. By HERBERT L. BORISON and DANIEL DOMJAN . 263

The carotid body in the duck and the consequences of its denervation upon the cardiac responses to immersion. By D. R. JONES and M. J. PURVES 279

The effect of carotid body denervation upon the respiratory response to hypoxia and hypercapnia in the duck. By D. R. JONES and M. J. PURVES 295

The effect of ions on the photoresponses of pigeon cones. By G. B. ARDEN and W. ERNST 311

The role of hypothalamic temperature in the control of panting in the chicken exposed to heat. By S. A. RICHARDS . . . 341

Ionotropic changes in the left ventricle: the effect of changes in heart rate, aortic pressure and end-diastolic pressure. By C. M. FURNIVAL, R. J. LINDEN and H. M. SNOW 359

Effects of calcium on the contraction of the hypodynamic frog heart. By R. A. CHAPMAN and R. NIEDERGERKE 389

Interaction between heart rate and calcium concentration in the control of contractile strength of the frog heart. By R. A. CHAPMAN and R. NIEDERGERKE 423

Effects of tetraethylammonium chloride on the membrane activity of guinea-pig stomach smooth muscle. By Y. ITO, H. KURIYAMA and Y. SAKAMOTO 445

The localization of pupilloconstrictor function within the mid-brain of the cat. By A. M. SILLITO and A. W. ZBROŻYNA . . 461

The effect on respiration of abrupt changes in carotid artery pH and P_{CO_2} in the cat. By D. M. BAND, I. R. CAMERON and S. J. G. SEMPLE 479

Changes in axon birefringence during the action potential. By L. B. COHEN, B. HILLE and R. D. KEYNES 495

PAGE

No. 3. *December*, 1970

The effect of calcium ions on long chain fatty acid transport by slices of rat jejunum. By K. A. Munday, B. J. Parsons and D. A. York 517

The effect of progressive hypoxia on the respiratory and cardiovascular systems of the pigeon and duck. By P. J. Butler . . 527

The relation between L-methionine uptake and sodium in rat small intestine *in vitro*. By H. Newey, A. J. Rampone and D. H. Smyth 539

Effects of catecholamines on the neuromuscular junction in the rat diaphragm. By K. Kuba 551

Calcium, magnesium and the electrical activity of guinea-pig olfactory cortex *in vitro*. By C. D. Richards and R. Sercombe . 571

The binding of thyroid hormones to phospholipid membranes. By A. P. Hillier 585

The range and scope of binocular depth discrimination in man. By Colin Blakemore 599

Sodium and potassium currents in squid axons perfused with fluoride solutions. By W. K. Chandler and H. Meves . . 623

Evidence for two types of sodium conductance in axons perfused with sodium fluoride solution. By W. K. Chandler and H. Meves 653

Rate constants associated with changes in sodium conductance in axons perfused with sodium fluoride. By W. K. Chandler and H. Meves 679

Slow changes in membrane permeability and long-lasting action potentials in axons perfused with fluoride solutions. By W. K. Chandler and H. Meves 707

Sodium and potassium conductance changes during a membrane action potential. By Francisco Bezanilla, Eduardo Rojas and Robert E. Taylor 729

Time course of the sodium permeability change during a single membrane action potential. By Illani Atwater, Francisco Bezanilla and Eduardo Rojas 753

The activity characteristics of the preganglionic pupilloconstrictor neurones. By A. M. Sillito and A. W. Zbrożyna . . . 767

Parallel spindle systems in the small muscles of the rat tail. By J. Thompson 781

PROCEEDINGS OF THE PHYSIOLOGICAL SOCIETY

18–19 *September* 1970

DEMONSTRATIONS

PAGE

Burns, M. D. & Delcomyn, F. Motor neurone activity during walking in insects . 1*P*

Spurway, N. C. & Young, A. Effects of two different regimes of moderate exercise upon the histochemical distribution of SDH in mouse calf muscles . . 2*P*

Kenny, G. N. C., Spurway, N. C. & Stenhouse, G. The anion permeability of frog skeletal muscle in fluoride solutions 3*P*

Roberts, T. D. M. Changes in stretch reflexes in limb extensor muscles during position reflexes from the labyrinth in the cat 5*P*

Roberts, T. D. M. A model to illustrate the effects of factors influencing the heart's action 6*P*

Roberts, T. D. M. Class experiment on reflex inhibition of the electrically recorded ankle jerk reflex in man 7*P*

Roberts T. D. M. The role of knee joint kinematics in standing with a bent knee . 8*P*

Ganguli, P. C. & Hunter, W. M. A radio-immunoassay for gastrin in human plasma 9*P*

Gillespie, J. S., MacLaren, A., Marshall, R. W., Muir, T. C. & Pollock, D. Segmental stimulation of spinal autonomic outflows in the pithed cat and rat . . 11*P*

Barve, Anjeli, Boardman, Lesley, Lamb, J. F. & McCall, D. The uptake of tritiated ouabain by monolayers of cultured cells under various conditions . . . 12*P*

Thompson, J. Parallel spindle systems and other nervous structures found in the intertransverse muscles of the rat's tail (T) 13*P*

Herd, D. J. & Jennett, Sheila. An arrangement for investigating the relationship between the cardiovascular and ventilatory responses of the cat to moderate hypoxia 13*P*

Forrester, T. & Lindsay, R. Effects of extracellular adenosine triphosphate—a multiple study 14*P*

Forrester, T. Use of the Aminco-Bowman spectrophotofluorometer in the estimation of adenosine triphosphate by the firefly luminescence technique (T) . 15*P*

Rees, D. & Usherwood, P. N. R. Changes in the spatial distribution of synaptic vesicles within degenerating endings of locust motoneurones 15*P*

Anderson, M., Cochrane, D. G., Elder, H. Y., Josephson, R. K. & Usherwood, P. N. R. Structure and function of phasic and tonic muscle fibres in locusts and grasshoppers 16*P*

Walther, C. Centrally-patterned rhythmic output of leg motoneurones in the stick insect, *Carausius morosus* (T). 17*P*

Ballard, Kathleen J., Biddlecombe, W. H., Elder, H. Y. & Spurway, N. C. The teaching of electron microscopy: its limitations and interpretation (T) . . 17*P*

Mackenna, B. R. & McKirdy, H. C. An isometric, isovolumic modification of Trendelenburg's method for the study of peristalsis *in vitro* (T) . . . 17*P*

Mackenna, B. R. & McKirdy, H. C. A simple method for investigating the functional relationship of the longitudinal and circular layers of the muscularis externa of the rabbit bowel, using a 'flat' preparation 18*P*

Ellis, F. R. & Spence, A. A. A critical evaluation of a nitrogen rebreathing method for the estimation of $P\bar{v}o_2$ 19*P*